

WHAT IS CLAIMED IS:

- 1 1. A power roller supporting structure for a toroidal
2 continuously variable transmission, the power roller
3 supporting structure comprising:
4 a moveable disk rotatable about a first axis and axially
5 moveable;
6 a stationary disk rotatable about the first axis and
7 axially fixed, each of the moveable and stationary disks
8 having a contact surface;
9 power rollers disposed between the moveable and
10 stationary disks in contact with the contact surfaces
11 thereof, each of the power rollers being rotatable about a
12 second axis and pivotally moveable about a third axis
13 extending perpendicular to the second axis upon rotation of
14 the moveable and stationary disks, the power rollers having
15 a friction contact position relative to the moveable and
16 stationary disks in which a speed ratio between rotational
17 speeds of the moveable and stationary disks is determined,
18 the friction contact position including a low speed ratio
19 position where a reduced speed ratio is obtained and a high
20 speed ratio position where an increased speed ratio is
21 obtained; and
22 an arrangement for allowing the power rollers to move
23 closer to the first axis along the second axis when the
24 power rollers are placed in the low speed ratio position
25 than when the power rollers are placed in the high speed
26 ratio position.
- 1 2. A power roller supporting structure for a toroidal
2 continuously variable transmission, the power roller
3 supporting structure comprising:
4 a moveable disk rotatable about a first axis and axially
5 moveable;

6 a stationary disk rotatable about the first axis and
7 axially fixed, each of the moveable and stationary disks
8 having a contact surface;

9 power rollers disposed between the moveable and
10 stationary disks in contact with the contact surfaces
11 thereof, each of the power rollers being rotatable about a
12 second axis and pivotally moveable about a third axis
13 extending perpendicular to the second axis upon rotation of
14 the moveable and stationary disks, the power rollers having
15 a friction contact position relative to the moveable and
16 stationary disks in which a speed ratio between rotational
17 speeds of the moveable and stationary disks is determined,
18 the friction contact position including a low speed ratio
19 position where a reduced speed ratio is obtained and a high
20 speed ratio position where an increased speed ratio is
21 obtained;

22 trunnions supporting the power rollers so as to allow
23 the rotation of the power rollers about the second axis and
24 the pivotal movement thereof about the third axis, each of
25 the trunnions having end portions opposed in a direction of
26 the third axis, wherein the arrangement comprises:

27 a first link including a first periphery defining a
28 first trunnion connection hole engaged with one of the end
29 portions of each of the trunnion; and

30 a second link including a second periphery defining a
31 second trunnion connection hole engaged with the other of
32 the end portions of each of the trunnions;

33 at least one of the first and second trunnion connection
34 holes being arranged to allow the power rollers to move
35 closer to the first axis along the second axis when the
36 power rollers are placed in the low speed ratio position
37 than when the power rollers are placed in the high speed
38 ratio position.

1 3. The power roller supporting structure as claimed in
2 claim 2, wherein at least one of the first and second
3 trunnion connection holes has a center which is offset from
4 a center of curvature of the contact surface of the
5 stationary disk in such a direction as to be away from the
6 first axis along the second axis when the power rollers are
7 placed in the high speed ratio position, in case that the at
8 least one of the first and second connection holes and the
9 second axis are projected onto a plane which extends
10 perpendicular to the third axis and contains the first axis
11 and the center of curvature of the contact surface of the
12 stationary disk.

1 4. The power roller supporting structure as claimed in
2 claim 2, wherein at least one of the first and second
3 trunnion connection holes has a center which is offset from
4 a center of curvature of the contact surface of the
5 stationary disk in such a direction as to come close to the
6 first axis along the second axis when the power rollers are
7 placed in the low speed ratio position, in case that the at
8 least one of the first and second trunnion connection holes
9 and the second axis are projected onto a plane which extends
10 perpendicular to the third axis and contains the first axis
11 and the center of curvature of the contact surface of the
12 stationary disk.

1 5. The power roller supporting structure as claimed in
2 claim 2, wherein at least one of the first and second
3 trunnion connection holes has a generally circular shape,
4 the at least one of the first and second peripheries
5 including a radius increasing portion at which the trunnion
6 connection hole is increased in radius in such a direction

7 as to be away from the first rotation axis along the second
8 rotation axis placed in the high speed ratio position, in
9 case that the at least one of the first and second
10 peripheries of the first and second links and the second
11 axis are projected onto a plane which extends perpendicular
12 to the third axis and contains the first axis and a center
13 of curvature of the contact surface of the stationary disk,

14 the radius increasing portion including a high-side
15 bearing portion which is pressed against the end portion of
16 the trunnion when the power rollers are placed in the high
17 speed ratio position, and a low-side bearing portion which
18 is pressed against the end portion of the trunnion when the
19 power rollers are placed in the low speed ratio position,
20 the high-side bearing portion being located more distant
21 from the center of curvature of the contact surface of the
22 stationary disk than the low-side bearing portion.

1 6. The power roller supporting structure as claimed in
2 claim 5, wherein the radius increasing portion includes two
3 sectoral regions disposed adjacent to each other on both
4 sides of the second axis within the plane when the power
5 rollers are placed in the high speed ratio position, each of
6 the sectoral regions having a central angle of substantially
7 90 degrees.

1 7. The power roller supporting structure as claimed in
2 claim 2, wherein at least one of the first and second
3 trunnion connection holes has a generally circular shape,
4 the at least one of the first and second peripheries
5 including a radius reducing portion at which the trunnion
6 connection hole is reduced in radius in such a direction as
7 to come close to the first rotation axis along the second
8 rotation axis placed in the low speed ratio position, in

9 case that the at least one of the first and second
10 peripheries of the first and second links and the second
11 axis are projected onto a plane which extends perpendicular
12 to the third axis and contains the first axis and a center
13 of curvature of the contact surface of the stationary disk,
14 the radius reducing portion including a high-side
15 bearing portion which is pressed against the end portion of
16 the trunnion when the power rollers are placed in the high
17 speed ratio position, and a low-side bearing portion which
18 is pressed against the end portion of the trunnion when the
19 power rollers are placed in the low speed ratio position,
20 the high-side bearing portion being located more distant
21 from the center of curvature of the contact surface of the
22 stationary disk than the low-side bearing portion.

1 8. The power roller supporting structure as claimed in
2 claim 7, wherein the radius reducing portion includes two
3 sectoral regions disposed adjacent to each other on both
4 sides of the second axis in the plane when the power rollers
5 are placed in the low speed ratio position, each of the
6 sectoral regions having a central angle of substantially 90
7 degrees.

1 9. The power roller supporting structure as claimed in
2 claim 2, wherein at least one of the first and second
3 trunnion connection holes has a generally circular shape
4 which has a diameter extending across a center of curvature
5 of the contact surface of the stationary disk along the
6 second axis when the power rollers are placed in each of the
7 high and low speed ratio positions, a midpoint of the
8 diameter being offset from the center of curvature of the
9 contact surface of the stationary disk, in case that the
10 trunnion connection hole having a generally circular shape

11 and the second axis are projected onto a plane which extends
12 perpendicular to the third axis and contains the first axis
13 and the center of curvature of the contact surface of the
14 stationary disk.

1 10. The power roller supporting structure as claimed in
2 claim 9, wherein the midpoint of the diameter is offset from
3 the center of curvature of the contact surface of the
4 stationary disk in such a direction as to be away from the
5 first axis along the second axis when the power rollers are
6 placed in the high speed ratio position.

1 11. The power roller supporting structure as claimed in
2 claim 9, wherein the midpoint of the diameter is offset from
3 the center of curvature of the contact surface of the
4 stationary disk in such a direction as to come close to the
5 first axis along the second axis when the power rollers are
6 placed in the low speed ratio position.

1 12. The power roller supporting structure as claimed in
2 claim 10, wherein the at least one of the first and second
3 trunnion connection holes has a circular shape which is
4 centered at the midpoint of the diameter.

1 13. The power roller supporting structure as claimed in
2 claim 11, wherein the at least one of the first and second
3 trunnion connection holes has a circular shape which is
4 centered at the midpoint of the diameter.

1 14. The power roller supporting structure as claimed in
2 claim 9, wherein the at least one of the first and second
3 trunnion connection holes has a modified circular shape
4 including a radially enlarged portion, the at least one of

5 the first and second peripheries of the first and second
6 links including a radius increasing portion at which the
7 trunnion connection hole is increased in radius in such a
8 direction as to be away from the first rotation axis along
9 the second rotation axis placed in the high speed ratio
10 position upon viewing the plane, the radius increasing
11 portion including a high-side bearing portion which is
12 pressed against the end portion of the trunnion when the
13 power rollers are placed in the high speed ratio position,
14 and a low-side bearing portion pressed against the end
15 portion of the trunnion when the power rollers are placed in
16 the low speed ratio position, the high-side bearing portion
17 being located more distant from the center of curvature of
18 the contact surface of the stationary disk than the low-side
19 bearing portion.

1 15. The power roller supporting structure as claimed in
2 claim 9, wherein the at least one of the first and second
3 trunnion connection holes has a modified circular shape
4 including a radially reduced portion, the at least one of
5 the first and second peripheries of the first and second
6 links including a radius reducing portion at which the
7 trunnion connection hole is reduced in radius in such a
8 direction as to come close to the first rotation axis along
9 the second rotation axis placed in the low speed ratio
10 position upon viewing the plane, the radius reducing portion
11 including a high-side bearing portion which is pressed
12 against the end portion of the trunnion when the power
13 rollers are placed in the high speed ratio position, and a
14 low-side bearing portion which is pressed against the end
15 portion of the trunnion when the power rollers are placed in
16 the low speed ratio position, the high-side bearing portion
17 being located more distant from the center of curvature of

18 the contact surface of the stationary disk than the low-side
19 bearing portion.

1 16. The power roller supporting structure as claimed in
2 claim 14, wherein the radius increasing portion includes two
3 sectoral regions disposed adjacent to each other on both
4 sides of the second axis within the plane when the power
5 rollers are placed in the high speed ratio position, each of
6 the sectoral regions having a central angle of substantially
7 90 degrees.

1 17. The power roller supporting structure as claimed in
2 claim 15, wherein the radius reducing portion includes two
3 sectoral regions disposed adjacent to each other on both
4 sides of the second axis in the plane when the power rollers
5 are placed in the low speed ratio position, each of the
6 sectoral regions having a central angle of substantially 90
7 degrees.